

CLAIMS

1. A catheter comprising:
a tubular catheter shaft, the tubular catheter shaft having a proximal portion and a distal portion, the distal portion terminating in a distal tip, the distal tip comprising a 5 matrix and at least one stripe, the matrix defined by at least one matrix material and the at least one stripe defined by at one stripe material, the at least one matrix material having a predetermined hardness and the at least one stripe material having a predetermined hardness, the predetermined hardness of the at least one stripe material having a greater hardness, the predetermined hardness of the at least one stripe material having a greater durometer value than the predetermined hardness of the at least one matrix material.
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2. The catheter of claim 1 wherein the tubular catheter shaft defines a lumen.
3. The catheter of claim 1 wherein the at least one stripe is substantially parallel to a longitudinal axis of the distal tip.
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4. The catheter of claim 3 wherein the least one stripe has a length substantially equal to that of the matrix.
5. The catheter of claim 1 wherein the at least one stripe is characterized as being 20 oriented in a helical manner about a longitudinal axis of the distal tip.
6. The catheter of claim 1 wherein the at least one stripe extends back and forth in a repeating manner from a first end of the distal tip to a second end of the distal tip at a predetermined angle relative to a longitudinal axis of the distal tip.
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7. The catheter of claim 1 wherein the at least one stripe comprises a first stripe and a second stripe,
the first stripe extending back and forth in a repeating manner from a first end of the distal tip to a middle portion of the distal tip at a predetermined angle relative to a

longitudinal axis of the distal tip,

the second stripe extending back and forth in a repeating manner from a second end of the distal tip to the middle portion of the distal tip at a second predetermined angle relative to the longitudinal axis of the distal tip.

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8. The catheter of claim 7 wherein the first predetermined angle and the second predetermined angle are the same.

9. The catheter of claim 1 wherein the at least one stripe is constructed of a plurality of 10 fibers of the at least one stripe material woven together to form at least one braid.

10. The catheter of claim 1 wherein the at least one stripe is a plurality of stripes.

11. The catheter of claim 10 wherein at least one of the plurality of stripes is 15 substantially parallel to a longitudinal axis of the distal tip.

12. The catheter of claim 10 wherein at least one of the plurality of stripes is oriented in a helical manner about a longitudinal axis of the distal tip.

20 13. The catheter of claim 10 wherein each of the plurality of stripes extend back and forth from the first end of the distal tip to the second end of the distal tip, each of the plurality of stripes being disposed at a predetermined angle relative to a longitudinal axis of the distal tip.

25 14. The catheter of claim 10 wherein each of the plurality of stripes has a predetermined length, the predetermined length of each of the plurality of stripes being randomly determined.

15. The catheter of claim 10 wherein each of the plurality of stripes is distributed

throughout the matrix in a uniform manner.

16. The catheter of claim 10 wherein each of the plurality of stripes is distributed throughout the matrix in a random manner.

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17. The catheter of claim 10 wherein each of the plurality of stripes has a uniform orientation relative to a longitudinal axis of the at least one sleeve.

18. The catheter of claim 10 wherein each of the plurality of stripes is distributed 10 throughout the matrix randomly.

19. The catheter of claim 10 wherein each of the plurality of stripes has a uniform orientation relative to a longitudinal axis of the distal tip.

15 20. The catheter of claim 10 wherein each of the plurality of stripes has a randomly determined orientation relative to a longitudinal axis of the distal tip.

21. The catheter of claim 1 wherein the at least one stripe is substantially enclosed by the matrix.

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22. The catheter of claim 1 wherein the matrix has an outside surface, the at least one stripe being engaged to the outside surface of the matrix.

23. The catheter of claim 1 wherein the matrix has an inside surface, the at least one 25 stripe being engaged to the inside surface of the matrix.

24. The catheter of claim 1 wherein the matrix material further comprises a plurality of matrix layers, each of the plurality of matrix layers being a different material.

25. The catheter of claim 24 wherein the plurality of matrix layers comprise an inner matrix layer and an outer matrix layer.

26. The catheter of claim 25 wherein the at least one stripe is positioned between at least 5 a portion of the inner matrix layer and the outer matrix layer.

27. The catheter of claim 25 wherein the plurality of matrix layers further comprise an intermediate matrix layer positioned between the inner matrix layer and the outer matrix layer, the at least one stripe being substantially enclosed within the intermediate 10 matrix material.

28. The catheter of claim 1 wherein the at least one matrix material is selected from at least one member of the group consisting of: polyester/polyether elastomers, polyurethane-polyether polymers, polyester-polyurethanes, polyester-polyurethanes, polyether block 15 amides (PEBA), styrene-butadien-styrene triblock copolymers, styrenic block copolymers, polyurethanes, silicone rubber, natural rubber, copolyesters, polyamides, EPDM rubber/polyolefin, nitril rubber/PVC, fluoroelastomers, butyl rubber, epichlorohydrin, soft block copolymers, and any combinations thereof.

20 29. The catheter of claim 1 wherein the at least one stripe material is selected from at least one member of the group consisting of: polyethylene terephthalate (PET), polyethylene naphthalate (PEN), polybutylene terephthalate (PBT), polytrimethylene terephthalate (PTT), engineering thermoplastic polyurethanes, fluoropolymers, polyester/polyether elastomers, polyurethane-polyether polymers, polyester-polyurethanes, polyether block amides (PEBA), 25 polyolefins, polystyrene, polyvinyl chloride, acrylonitrile-butadiene-styrene polymers, polyacrylonitrile, polyacrylate, vinyl acetate polymer, cellulose plastics, polyurethanes, polyacetal, polyethers, polycarbonates, polyamides, polyphenylene sulfide, polyarylethersulfones, polyaryletherketones, polytetrafluoroethylene, polyamide copolymer, and any combinations thereof.

30. The catheter of claim 1, wherein the at least one matrix material has a durometer hardness value in a range of about 25D to about 74D, and the at least one stripe material has a durometer hardness value in a range of about 55D to about 84D.

5 31. The catheter of claim 30 wherein the at least one matrix material has a durometer hardness value of about 55D, and the at least one stripe material has a durometer hardness value of about 80D.

10 32. The catheter of claim 1 wherein the catheter is selected from the group consisting of dilatation catheters, guide catheters, over-the-wire catheters, rapid exchange catheters, single-operator-exchange catheters, medical device delivery catheters, and any combinations thereof.

15 33. The catheter of claim 1 wherein at least a portion of the distal tip is radiopaque.

34. A tubular member for use as a distal tip of a catheter comprising:
a matrix and at least one stripe, the matrix at least partially defining the tubular member, the at least one stripe engaged to the matrix material, the matrix defined by at least one matrix material and the at least one stripe defined by at one stripe material, the at least one matrix material having a predetermined hardness and the at least one stripe material having a predetermined hardness, the predetermined hardness of the at least one stripe material having a greater durometer value than the predetermined hardness of the at least one matrix material.